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## **Drinking goal trajectories and their association with client characteristics and outcomes among clients in outpatient alcohol treatment**

Haug, Severin ; Paz Castro, Raquel ; Eggli, P ; Schaub, Michael P

**Abstract:** Background: Drinking goal preferences could change over time in alcohol treatment and during follow up. Objectives: To examine the stability of drinking goals over time, types of drinking goal trajectory, and the associations between drinking goal trajectories and baseline client characteristics and treatment outcomes. Methods: We performed secondary analysis of a dataset from a multicenter longitudinal study on the effectiveness of outpatient alcohol treatment (n = 543). Drinking goals (abstinence, controlled drinking, nonrestricted drinking, undecided) and alcohol use were assessed at treatment admission, discharge, and 6- and 12-month follow up. Results: At admission, 32% of the subjects aimed for abstinence and 57% for controlled drinking, while 10% were undecided, and 1% did not want to restrict themselves. The proportions of clients aiming for abstinence and controlled drinking were relatively stable across the four assessments, and the proportion of clients who changed their drinking goal from abstinence to controlled drinking did not differ significantly from the number who changed in the opposite direction. Clients with abstinence-focused trajectories reported higher baseline alcohol use than those focused primarily on controlled drinking. Meanwhile, attaining nonhazardous drinking and reduced alcohol use at 12-month follow up were more likely among clients with abstinence-focused trajectories than those focused on controlled drinking. Conclusions: Since the majority of clients maintain their initially selected drinking goal, counsellors might inform them at treatment admission about the various probabilities of achieving nonhazardous drinking depending on their selected drinking goal.

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## Abstract

*Background:* Drinking goal preferences could change over time in alcohol treatment and during follow up. *Objectives:* To examine the stability of drinking goals over time, types of drinking goal trajectory, and the associations between drinking goal trajectories and baseline client characteristics and treatment outcomes. *Methods:* We performed secondary analysis of a dataset from a multi-centre longitudinal study on the effectiveness of outpatient alcohol treatment (n=543). Drinking goals (abstinence, controlled drinking, non-restricted drinking, undecided) and alcohol use were assessed at treatment admission, discharge, and 6- and 12-month follow up. *Results:* At admission, 32% of the subjects aimed for abstinence and 57% for controlled drinking, while 10% were undecided and 1% did not want to restrict themselves. The proportions of clients aiming for abstinence and controlled drinking were relatively stable across the four assessments, and the proportion of clients who changed their drinking goal from abstinence to controlled drinking did not differ significantly from the number who changed in the opposite direction. Clients with abstinence-focused trajectories reported higher baseline alcohol use than those focused primarily on controlled drinking. Meanwhile, attaining non-hazardous drinking and reduced alcohol use at 12-month follow up were more likely among clients with abstinence-focused trajectories than those focused on controlled drinking. *Conclusions:* Since the majority of clients maintain their initially selected drinking goal, counsellors might inform them at treatment admission about the various probabilities of achieving non-hazardous drinking depending on their selected drinking goal.

**Keywords:** alcohol, drinking goal, outpatient, outcome

## Background

Only a minority of individuals suffering from alcohol use disorders seek professional help (Cohen, Feinn, Arias, & Kranzler, 2007; Rehm et al., 2015). Providing low-threshold, individually-tailored treatment could increase the utilization of professional help and, therefore, reduce alcohol-attributable mortality (Bühringer & Rumpf, 2015; Dawson, Grant, Stinson, & Chou, 2006; Rehm et al., 2014). Programs that can tailor treatments to their clients' personal drinking or abstinence goals might be more attractive and could lead to greater commitment to, and compliance with treatment. Clients generally prefer being able to choose their own drinking goal; if given a choice, many select the goal that best fits their circumstances (Adamson & Sellman, 2001; Sanchez-Craig, Annis, Bornet, & MacDonald, 1984). Allowing clients to select their own drinking goal rather than having one assigned to them is likely to result in them being more committed to that goal and actively working towards it; however, its impact on ultimate outcomes remains unclear (Booth, Dale, & Ansari, 1984; Lozano & Stephens, 2010).

Three larger-scale studies have documented the association between pre-treatment drinking goals selected by clients themselves and treatment outcomes. Within the United Kingdom Alcohol Treatment Trial (UKATT) (Godfrey & Team, 2005), patients were asked whether or not they preferred to aim for abstinence as a goal of treatment. While patients who preferred abstinence generally had more abstinent days at 12 months of follow up, no differences between goal abstainers and goal non-abstainers were observed in either drinking intensity or the severity of dependence (Adamson, Heather, Morton, & Raistrick, 2010). Within the COMBINE study, conducted in the United States (US), participants could choose controlled drinking, conditional abstinence (temporary abstinence or the potential for lapses), or complete abstinence (Bujarski, O'Malley, Lunny, & Ray, 2013). The last of these three choices was associated with the most favourable outcomes, whereas participants who sought controlled drinking fared the worst. Further analysis within the COBMINE study (Dunn &

Strain, 2013), with participants who reported a non-abstinent drinking goal matched with those who reported an abstinent drinking goal, underline the clinical utility of drinking treatment goal and the need to include it as a stratification variable in study interventions and as a covariate in outcome analyses. Initial results from a Swiss study on clients in outpatient alcohol treatment revealed that non-hazardous drinking at 12 months follow up was more likely in clients whose initial aim was alcohol abstinence than among those whose goal was controlled drinking (Haug & Schaub, 2016).

On the other hand, several studies have shown that drinking goal preference is a dynamic variable that could change over time in either direction: from abstinence to non-abstinence or vice versa (Enggasser et al., 2015; Hodgins, Leigh, Milne, & Gerrish, 1997; Meyer, Wapp, Strik, & Moggi, 2014; Ojehagen & Berglund, 1989). In a Swiss study involving patients in residential alcohol treatment programs, 46% changed their drinking goal (abstinence, conditional abstinence, or controlled drinking) from treatment admission to discharge (Meyer et al., 2014). The predictive value of drinking goals for drinking outcomes at one-year follow up was notably higher at discharge than admission, with goal abstainers at discharge experiencing the best outcomes. In a Swedish study on changes in drinking goals among 50 clients at an alcohol treatment program lasting two years, 44% changed their drinking goal (abstinence or controlled drinking) at least once over this period (Ojehagen & Berglund, 1989). Women generally were more stable in their goal choice. However, patients who changed their drinking goal had similar outcomes as those who did not.

A recent study from the US examined the association between four goal choice patterns, based on each client's initial and final drinking goal (controlled drinking only, abstinence only, controlled drinking to abstinence, abstinence to controlled drinking) and outcome during a web-based alcohol intervention, wherein the vast majority of participants (87%) had an initial goal of controlled drinking (Enggasser et al., 2015). Approximately four fifths of the subjects who initially chose either abstinence or controlled drinking remained consistent in

their drinking goal. Post-intervention alcohol consumption declined in each of the four goal-pattern groups, with participants who consistently chose abstinence exhibiting the largest reduction.

The present study builds upon these previous studies on the dynamics between drinking goal choices and both baseline client characteristics and post-treatment outcomes. We conducted secondary data analysis on 543 clients who had participated in a naturalistic, longitudinal multi-centre study on the effectiveness of outpatient alcohol treatment in Switzerland. We assessed drinking goal choice (abstinence, controlled drinking, undecided, non-restricted) and alcohol use at treatment admission, discharge, and 6 and 12 months of follow-up. While previous studies reduced the complexity of intermediate or repeated changes in drinking goal choices by focusing solely on initial and final alcohol consumption goals (Enggasser et al., 2015; Hodgins et al., 1997; Meyer et al., 2014; Ojehagen & Berglund, 1989), we analysed all available longitudinal data using Sequence Analysis (Gabadinho, Ritschard, Muller, & Studer, 2011). This method allowed for the description of the dynamics of drinking goal choices over time. Specifically, we examined (1) the stability of and changes in drinking goals over time; (2) the types of drinking goal trajectory; (3) the association between drinking goal trajectories and client characteristics; and (4) the association between drinking goal trajectories and treatment outcomes.

## Methods

### *Study design and main outcome*

We conducted secondary data analyses on an available data set from a naturalistic, longitudinal multi-centre study on the effectiveness of outpatient alcohol treatment in Switzerland (Haug & Schaub, 2016). In this study, assessments were conducted at the time of admission into treatment, discharge from treatment, and in follow-up both 6 and 12 months

after discharge from treatment. A detailed description of the study's methodology and results is published elsewhere (Haug & Schaub, 2016).

All of the participating institutions utilized motivational interviewing approaches (e.g., the pros and cons of alcohol abstinence and alcohol reduction; strategies for goal achievement) (Miller & Rollnick, 2013), the principles of cognitive behavioural therapy (identifying risky situations, situational analysis, relapse prevention), and behavioural self-management (e.g., a drinking diary).

All participating outpatient alcohol treatment centres provided information and specific interventions for controlled drinking, permitting controlled drinking as an outcome goal regardless of the client's severity of dependence (Klingemann & Rosenberg, 2009). Over the course of this study, 45% of all clients with hazardous drinking at the beginning of treatment exhibited non-hazardous drinking by the end of treatment, with corresponding percentages of 41% and 43% at 6 and 12 months of post-treatment follow-up, respectively.

Prior to data collection, study approval had been obtained from the local ethics committee of the Canton of Zurich, Switzerland (KEK-StV-Nr. 05/11). All study participants provided informed written consent.

### *Participants*

Study participants were recruited from five Swiss outpatient alcohol treatment centres, two in Berne (Stiftung Berner Gesundheit, Blaues Kreuz Bern), and one each in Zurich (Zürcher Fachstelle für Alkoholprobleme), Aarau (Aargauische Stiftung Suchthilfe), and Baden (Beratungszentrum Bezirk Baden). Clients who entered treatment between March 2011 and November 2012 and finished treatment before December 2013 were included in the study if (1) their own alcohol consumption had been the primary reason for treatment, and (2) they had received at least three counselling sessions. Otherwise-eligible clients were excluded from analysis for any of the following reasons: (1) cognitive impairment or language

difficulties that prevented them from completing the questionnaire; (2) representation by a legal guardian; or (3) any acute emergency.

The flow of study subjects is displayed in Figure 1. Within the study period, a total of 2513 clients entered treatment because of their alcohol consumption. Of these clients, 340 (13.5%) were excluded because they met one or more of the above-mentioned exclusion criteria. In addition, fewer than three counselling sessions had been attended by 925 clients (36.8%). Consequently, 1248 clients ultimately were eligible for study participation. Of these, 1009 (80.8%) provided informed consent. From the 858 clients who finished treatment before December 2013, and who represented the sample for the study on the effectiveness of outpatient treatment (Haug & Schaub, 2016), we used a subsample of 543 clients for the present analyses, only including clients who (1) exhibited hazardous drinking, as per the AUDIT-C (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998), with a cut-off point of  $\geq 4$  for women and  $\geq 5$  for men (Rumpf, Meyer, Bischof, Freyer-Adam, & John, 2013); and (2) stated their drinking goal at treatment admission. We excluded clients without hazardous drinking because of this group's heterogeneity, including clients receiving aftercare following alcohol detoxification, clients with subthreshold alcohol use disorder, and clients who had reduced their alcohol use significantly before treatment admission. Of the 543 clients analysed for the present study, 182 (33.5%) completed questionnaires at the end of treatment, 342 (63.0%) at six months of follow up, and 325 (59.9%) at 12 months of follow up.

### *Measures and instruments*

The following client data were assessed at treatment admission by the counsellor: (1) gender; (2) age; (3) nationality; (4) educational level; (5) means of subsistence; (6) partner; (7) children living in the household; (8) referring person or institution; and (9) new admission or readmission to the respective institution.



Clients were asked to provide information on the following at both the beginning and end of treatment, as well as at 6 and 12 months of follow-up: (1) general health; (2) life satisfaction; (3) drinking goal; (4) alcohol use; (5) days of alcohol abstinence over the previous 30 days; (6) use of other substances besides alcohol; and (7) use of psychotherapy or psychiatric treatment over the previous 6 months.

Self-rated general health (Idler & Benyamini, 1997) was assessed by the item “Would you say that your health generally is: (1) excellent, (2) very good, (3) good, (4) fair, or (5) poor?”

Subjective quality of life was assessed using *the Questions on Life Satisfaction* tool (Heinrich & Herschbach, 2000), which covers eight areas of life: friends/acquaintances, leisure time/hobbies, health, income/financial security, occupation/work, housing/living conditions, family life/children, and partner relationship/sexuality. Participants rated their satisfaction with each area on a 5-point scale ranging from “not satisfied” to “very satisfied.” The total score, which is the sum of these eight scores, ranged from 8 to 40. The Questions on Life Satisfaction had previously been demonstrated to have a high level of internal consistency, adequate sensitivity, and adequate construct validity (Heinrich & Herschbach, 2000).

Drinking goal was assessed by the item “Which is currently your personal goal concerning alcohol consumption”, with the following response options: (1) I do not want to restrict my alcohol intake (in the following referred to as “no restriction”); (2) I only want to drink a certain quantity of alcohol (“controlled drinking”); (3) I want to be totally abstinent (“abstinence”); and (4) I have not yet decided (“not yet decided”).

Alcohol consumption within the previous 30 days was assessed using the *Short Form of the Alcohol Use Disorders Identification Test* (AUDIT-C) (Bush et al., 1998). This consists of three items on (1) the frequency of alcohol consumption, (2) the quantity of alcohol consumed, and (3) the occurrence and frequency of binge drinking. Pictures were used to illustrate the volume of a standard drink that corresponds to 12 to 14 grams of pure alcohol. Based on a recent validation study on a large German sample, thresholds of  $\geq 4$  for women

and  $\geq 5$  for men were used to define hazardous drinking (Rumpf et al., 2013). Non-hazardous drinking also included alcohol abstinence. Beyond non-hazardous drinking at 12-months follow up, we considered reduced alcohol use as an indicator of a positive treatment outcome. The latter was defined as the magnitude of reduction in the AUDIT-C-score from baseline to the 12-month follow-up assessment.

Use of substances other than alcohol was assessed via the question “Which substances have you used over the previous 30 days”, with subjects asked to indicate ‘Yes’ or ‘No’ for each of the following: (1) tobacco, (2) tranquilizer, (3) analgesics, (4) cannabis, (5) amphetamine-type stimulants, (6) cocaine, (7) heroine, and (8) therapeutic opioid substitutes (e.g., methadone, buprenorphine).

### *Statistical analysis*

To begin, we calculated descriptive statistics summarizing the number and percentage of clients who had chosen each of the four drinking goal options at each of the four data collection points. To examine whether drinking goals differed between admission and further assessments, we used McNemar tests for pair-wise comparisons of the various drinking goal frequencies between treatment admission and discharge, treatment admission and 6-months follow up, and treatment admission and 12-months follow up. Furthermore, to examine the direction of changes in drinking goals over time, we compared the number with each of the four drinking goals chosen at discharge, 6- and 12-month follow-ups against the drinking goals chosen at admission. We also used McNemar’s test to examine whether the proportion of clients who had changed their drinking goal from abstinence to controlled drinking differed from the proportion that had changed in the opposite direction, between admission and discharge, admission and 6-month follow up, and admission and 12-month follow up. Sequence analysis was performed using the TraMineR library (Version 1.8-8) in the statistical software package R (Gabadinho et al., 2011). For each client, drinking goals (as measured

above) were ordered into a sequence of states (i.e., drinking goal trajectories). Similarities between clients' state sequences were computed using the optimal matching (OM) distance algorithm. OM is defined as the minimal effort, in terms of insertions, deletions and substitutions, of transforming one sequence into another. This approach was deemed best suited to our sample, since subjects chose their drinking goals freely, in accordance with their preferences and not in accordance with the guidelines of therapy, so that position-wise similarities were less important. We understand, via similar trajectories, that a patient whose sequence is "Abstinence-Controlled drinking-Abstinence-Abstinence" could be in the same cluster as a patient with the sequence "Abstinence- Abstinence-Abstinence-Controlled drinking". One advantage of OM in sequence analysis is that it can handle missing data. Homogeneous trajectory groups (clusters) were then constructed from the distance matrix using agglomerative nesting hierarchical clustering and Ward's linkage method. The chosen partition was based on the distances between merging clusters; more specifically, we chose the partition that displayed the greatest degree of coherence, in terms of the average silhouette width (ASW) implemented in the WeightedCluster R library (Studer, 2013). This measure ranges from -1 to +1 and can be interpreted as the degree of coherence of assignments to clusters: high coherence (close to 1) indicates large between-group distances and strong within-group homogeneity. With this measure, the quality of the different trajectory groups (clusters) could also be assessed.

We reviewed client characteristics at baseline by type of drinking goal trajectory and conducted binary logistic regression analyses to identify differences in client characteristics between comparable drinking goal trajectories; i.e., trajectories with similar patterns, like clients aiming towards abstinence at all assessments versus those aiming towards controlled drinking at all assessments. Initially, separate binary logistic regression analyses were performed (subsequently referred to as univariate analyses) to evaluate the ability of each client characteristic to predict one drinking goal trajectory versus another. After examining

these univariate predictors, multivariate prediction models were developed. As suggested by Hosmer, Lemeshow, and Sturdivant (2013), variable selection consisted of the following steps: (1) Significant predictors ( $p < .05$ ) identified during univariate analyses were entered into the preliminary multivariate model. (2) Variables that were non-significant at  $p > .05$  were removed, one at a time, with those with the highest p-values removed first (backward selection). (3) To account for suppressor effects, the resulting model was verified by tentatively adding the aforementioned excluded variables, separately, to the regression model. Only variables significant at  $p < .05$  and the variable “treatment centre” were retained in the final regression model (forward selection).

Finally, we compared treatment outcomes between clients by drinking goal trajectory. Binary logistic or linear regression analyses were conducted, with the two indicators of a positive treatment outcome (1) non-hazardous drinking at 12-month follow up; and (2) magnitude of reduction in AUDIT-C score between baseline and 12-month follow up entered as dependent variables. Since clients within the various drinking goal trajectories differed with respect to several baseline variables that might also be associated with the treatment outcome (Adamson, Sellman, & Frampton, 2009; Haug & Schaub, 2016), the type of drinking goal trajectory was entered into each regression model, along with the treatment centre and the following client characteristics: gender, age, nationality, educational level, means of subsistence, AUDIT-C score, level of life satisfaction, days of alcohol abstinence over the preceding 30 days, use of substances other than alcohol over the previous 30 days, psychotherapy/psychiatric treatment within the past 6 months, and first versus readmission to the respective alcohol treatment centre.

R was used to perform all sequence analyses, while SPSS version 22 was used for all other analyses. All statistical tests were two-tailed, with  $p < .05$  set as the criterion for statistical significance.

## Results

### *Client characteristics*

Table 1 summarizes characteristics of the study participants at treatment admission. Of the 543 study participants, 345 (63.5%) were male. The mean age of clients was 42.2 years ( $SD=12.0$ ) and their mean AUDIT-C score was 8.7 ( $SD=2.4$ ).

### *Treatment characteristics and treatment discharge*

The mean duration of treatment was 219.7 days ( $SD = 188.0$ ), during which a mean of 9.8 ( $SD = 8.2$ ) individual and 1.0 ( $SD = 3.6$ ) group sessions were attended. A total of 256 (47.1%) participants were discharged regularly, with ( $n = 20$ ; 3.7%) or without ( $n = 236$ ; 43.5%) transfer to another institution. In contrast, 254 (46.8%) participants were discharged in a more irregular way for a variety of reasons that included a change of residence ( $n = 8$ ; 1.5%), hospitalisation ( $n = 1$ ; 0.2%), imprisonment ( $n = 1$ ; 0.2%), loss of contact ( $n = 210$ ; 38.7%), discontinuation of treatment ( $n = 31$ ; 5.7%), and death ( $n = 3$ ; 0.6%). Data concerning discharge were missing for 33 subjects (6.1%).

### *Stability of drinking goals*

Of the 543 study participants, 174 (32.0%) indicated at the time of admission into treatment that their goal was abstinence, while 311 (57.3%) sought controlled drinking, 54 (9.9%) were undecided, and 4 (0.7%) did not want to restrict their alcohol intake. Figure 2 shows the drinking goal percentages at each of the four assessments. Pairwise comparisons of the various drinking goal frequencies between treatment admission and discharge, treatment admission and 6-month follow up, and treatment admission and 12-month follow up, revealed three statistically-significant results. The first two were that the number of clients who did not want to restrict their alcohol intake at all was higher at six ( $p = .02$ ) months and again at 12 months ( $p = .01$ ) of follow up than at the time of admission into treatment. The third was that

the number of undecided clients was lower at 12 months of follow up than at admission ( $p=.01$ ).

The percentage of clients maintaining their drinking goal was 69.2% (126/182) from treatment admission to discharge, 63.2% (216/342) from treatment admission to 6-month follow up, and 62.2% (202/325) from treatment admission to 12-month follow up. The proportion of clients who changed their drinking goal from abstinence to controlled drinking did not differ statistically from those who changed from controlled drinking to abstinence. Respective percentages were: 31.4% (16/51) versus 11.9% (12/101) from admission to discharge ( $\chi^2=.32$ ,  $p=.57$ ); 37.9% (36/95) versus 14.0% (24/172) from admission to 6-months follow up ( $\chi^2=2.02$ ,  $p=.16$ ); and 34.7% (33/95) versus 18.6% (31/167) from admission to 12-months follow up ( $\chi^2=.02$ ,  $p=.90$ ).

Among the 138 clients with valid data on drinking goal preferences at each of the four assessments, 71 (51.4%) expressed the same preference at all four assessments: 51 consistently aimed toward controlled drinking, while 20 consistently sought abstinence. Univariate and multivariate logistic regression analysis, as described in the statistical analysis section, were performed in order to compare baseline characteristics between clients expressing the same preference at all four assessments and those who did change their drinking goal over time. The resulting final multivariate model solely included educational level and revealed that clients who changed their drinking goal over time less often had a medium educational level (low educational level: 7.4 vs. 21.3%, medium educational level: 72.2% vs. 51.1%, high educational level: 20.4% vs. 27.7%; reference: low educational level, OR=.25, 95%-CI .07-.90).

#### *Types of drinking goal trajectory*

Homogeneous groups of drinking goal trajectory were identified using cluster methods (see Methods for details). Out of 625 theoretical possible drinking goal trajectories, 105 different

patterns were observed in the data. To best describe the complexity of drinking goal trajectories in this study, we chose an eight-cluster solution. Eight clusters were more informative with respect to typical drinking goal trajectories than a solution with fewer clusters, while they also generated the largest average silhouette width value (ASW = 0.45). The ASW used to assess the quality of the partition demonstrated that the eight-cluster solution was reasonably structured, but that some clusters were more homogenous and distinct than others; see the ASW values for each cluster below.

Figure 3 illustrates the eight-cluster solution. Subjects in cluster 1 (n=34, 6.3%) aimed towards abstinence at all assessment times (AAAA, ASW= 0.56), while those in cluster 2 (n=79, 14.5%) also sought abstinence at all available assessment times, but had missing data at treatment discharge (AMAA, ASW= 0.19). Cluster 3 (n=62, 11.4%) subjects ultimately desired abstinence at treatment admission, but did not provide drinking goal data at discharge or at either follow-up (AMMM, ASW= 0.41). Those in cluster 4 (n=116, 21.4%) wanted controlled drinking at all assessment times (CCCC, ASW= 0.37), which was similar to those in cluster 5 (n=112, 20.6%), who also aimed towards controlled drinking at all available assessments, but had missing data at treatment discharge (CMCC, ASW= 0.44). Cluster 6 (n=92, 16.9%) subjects wanted controlled drinking at treatment admission, but failed to provide drinking goal data at discharge and at either follow-up assessment (CMMM, ASW= 0.79). Subjects in cluster 7 (n=22, 4.1%) were undecided about their drinking goal at admission and provided no data at treatment discharge, but expressed a desire for either controlled drinking or abstinence at both follow-up assessments (UMCC\_UMAA, ASW= 0.22). Cluster 8 (n=26, 4.8%) subjects sought controlled drinking at treatment admission and abstinence at 12 months of follow up; however, they provided no data at either treatment discharge or 6-month follow up (CMMA, ASW= 0.43).

*Comparing client characteristics by drinking goal trajectories*

Table 2 summarizes client baseline characteristics by drinking goal trajectory. The final multivariate logistic regression model comparing baseline characteristics of clusters 1 (AAAA) and 4 (CCCC) showed that clients whose goal was controlled drinking versus abstinence at all assessments had lower AUDIT-C scores ( $p < .01$ , OR=0.66, 95%-CI 0.53-0.82) and were more likely to be of Swiss nationality ( $p = .05$ ; OR=0.28, 95%-CI 0.08-0.97). A comparison of clusters 2 (AMAA) and 5 (CMCC) revealed that clients aiming for controlled drinking versus abstinence at admission and both follow-up visits had lower AUDIT-C scores ( $p = .01$ , OR=0.80, 95%-CI 0.68-0.94), greater life satisfaction ( $p = .01$ , OR=1.08, 95%-CI 1.02-1.15), and fewer days of alcohol abstinence over the previous 30 days ( $p < .01$ , OR=0.92, 95%-CI 0.88-0.96). Comparing clusters 3 (AMMM) and 6 (CMMM) showed that clients who initially sought controlled drinking versus those aiming for abstinence had fewer days of alcohol abstinence over the previous 30 days ( $p < .01$ , OR=0.93, 95%-CI 0.89-0.96).

Comparing clusters 2 (AMAA) and 7 (UMCC\_UMAA) revealed that initially-undecided clients had fewer days of alcohol abstinence over the preceding 30 days than those initially aiming towards abstinence ( $p = .04$ , OR=0.95, 95%-CI 0.90-1.00). Finally, comparing clusters 5 (CMCC; initially seeking controlled drinking) and 7 (UMCC\_UMAA; those initially undecided), the former reported less life satisfaction ( $p = .01$ , OR=0.90, 95%-CI 0.83-0.98). No significant differences were found between clusters 2 (AMAA) and 8 (CMMA).

#### *Comparing treatment outcomes by drinking goal trajectory*

Treatment outcomes by type of drinking goal trajectory and comparisons of outcomes between drinking goal trajectories are summarized in Table 3. Relative to clients aiming for abstinence at all assessments (AAAA), the odds of non-hazardous drinking at 12-month follow up, according to the AUDIT-C, was lower among clients who desired controlled drinking at all assessments (CCCC, adjusted OR = 0.05, 95%-CI = 0.01-0.30,  $p < .01$ ). A



similar result was obtained comparing clients seeking abstinence at admission and both follow-up visits against those wanting controlled drinking at admission and follow-up (AMAA vs. CMCC, adjusted OR = 0.07, 95%-CI = 0.02-0.27,  $p < .01$ ). Similar significant differences were detected between these primarily abstinence- and controlled drinking-focused trajectories, when magnitude of reduction in AUDIT-C score between baseline and 12-month follow up was used as the indicator of positive treatment outcome (AAAA vs. CCCC:  $T = -7.56$ ,  $p < .01$ ; AMAA vs. CCCC:  $T = -4.42$ ,  $p < .01$ ). We obtained no significant differences in treatment outcomes comparing the drinking goal trajectories AMAA versus UMCC\_UMAA, CMCC versus UMCC\_UMAA, or AMAA versus CMMA.

## Discussion

Using a sample of clients attending outpatient alcohol treatment, the present study examined (1) stability and changes in drinking goals over time; (2) types of drinking goal trajectory; (3) the association between drinking goal trajectories and client characteristics; and (4) the association between drinking goal trajectories and treatment outcomes.

The study revealed three main findings. First, the proportions of clients who sought abstinence and controlled drinking were relatively stable across the four assessments, and the proportions of clients who changed their drinking goal from abstinence to controlled drinking did not differ from those who changed in the opposite direction. Second, relative to clients with controlled drinking-focused trajectories, clients with primarily abstinence-focused trajectories reported more initial alcohol use. Third, the odds of non-hazardous drinking, the presumably desired outcome for all in treatment, at 12-months follow up was higher among clients with abstinence-focused trajectories than those who focused on controlled drinking, similar results were obtained when magnitude of alcohol use reduction was used as the indicator of positive treatment outcome.

That 69% of our subjects maintain their initially-selected drinking goal through to treatment program discharge agrees with the findings of other previously-published studies (Enggasser et al., 2015; Hodgins et al., 1997; Meyer et al., 2014; Ojehagen & Berglund, 1989) that the majority of clients maintain their initially-selected drinking goal over the course of treatment. Furthermore, we found that that the initially-selected drinking goal was typically maintained after discharge, with more than 60% of clients stating similar drinking goal preferences at 6- and 12-month follow up as at admission. However, we also noted a somewhat dynamic nature of drinking goals, with a substantial proportion of clients altering their goal, though the proportion of clients who moved from abstinence to controlled drinking was not statistically different from those who went in the opposite direction. This agrees with descriptive findings reported by (Enggasser et al., 2015) who found similar proportions of changes in both directions; but they are contrary to those of Hodgins et al. (1997), who reported a higher proportion moving from controlled drinking to abstinence.

How subjects with different drinking goal trajectories differed in their baseline characteristics in our sample mirrors the findings of others, with more severe alcohol use or alcohol problems in subjects with abstinence-focused versus other trajectories (Hodgins et al., 1997; Ojehagen & Berglund, 1989). Why this is so, is not entirely clear. However, one reasonable conjecture is that those with more severe drinking problems might be more aware of the need for them to abstain totally.

Concerning treatment outcomes, our results underline the more favourable outcomes observed amongst individuals seeking abstinence at treatment discharge than those still working towards controlled drinking (Hodgins et al., 1997; Meyer et al., 2014). While roughly 75% of the clients who focussed on controlled drinking reported decreased alcohol consumption from baseline to 12-month follow up, less than one third (30%) achieved a state of non-hazardous drinking. Thus, the majority of clients who initially sought to achieve controlled drinking continued to suffer from alcohol-related risks and sequelae. However, it should be considered

that from the clients' personal perspective, this treatment outcome might have been successful as it is possible that many of them set controlled drinking goals above the non-hazardous drinking level, as was the case in the study from Enggasser et al. (2015).

Implications for the provision and tailoring of outpatient alcohol treatment might particularly result from two of our findings: first, that the majority of clients maintained their initially-selected treatment goal; and second, that clients who wanted to continue to drink alcohol in a controlled way had more long-term hazardous drinking than those who sought to abstain totally. What this means is that clients who are undecided at treatment admission as to which goal to pursue should be advised to choose total abstinence. It also means that clients who wish to be able to continue with controlled drinking might be informed about the variable likelihood of ultimately becoming free of adverse alcohol-related consequences depending upon their selected drinking goal. On the other hand, this information should not undermine the potential beneficial effects of autonomous goal selection (Booth et al., 1984; Lozano & Stephens, 2010).

Certain limitations of the current study warrant mentioning. To begin with, the samples sizes for single drinking-goal trajectories were small, not permitting the detection of small or medium-sized effects, particularly those trajectories that included initial indecision and those among subjects who altered their drinking goals over time (UMCC\_UMAA, CMMA).

Second, we were unable to consider all the potential predictors of outcome and covariates of drinking goal that have been identified in previous studies, like a person's readiness to change or social support for drinking (Adamson et al., 2009; Heather, Adamson, Raistrick, & Slegg, 2010). Third, all of the outcome data on alcohol use were self-reported and not measured or verified by biochemical markers. Fourth, beyond the AUDIT-C, which measures alcohol use, and presents only a screening instrument for alcohol-related problems, we did not assess other indicators of the severity of alcohol use disorders. Finally, we did not reach a substantial

percentage of the study participants at discharge and follow-up assessments and drop out might be associated with drinking goal or change in drinking goal.

### Conclusions

The findings of this study extend previous evidence on drinking-goal changes and their relationship to outcomes via the use of a relatively large sample, the assessment of drinking goal choices beyond treatment discharge, and the use of all available longitudinal data and the clustering of these data via sequence analysis. Future controlled studies might test whether or not those whose initial goal excludes abstinence might benefit from being informed about their likelihood of achieving freedom from adverse alcohol-related consequences depending upon their selected drinking goal.

### Declaration of interests

The authors report no conflicts of interest.

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Table 1: Client characteristics at treatment admission

Study participants (n = 543)	
Sex	
Female	198 (36.5%)
Male	345 (63.5%)
Age in years, <i>M (SD)</i>	44.2 (12.0)
19–30	80 (14.7%)
31–50	291 (53.6%)
51–84	167 (30.8%)
Missing	5 (0.9%)
Nationality	
Swiss	474 (87.3%)
Other (mainly German, Italian, Austrian, or Portuguese)	64 (11.8%)
Missing	5 (0.9%)
Educational level	
Low (partly completed or completed compulsory education)	76 (14.0%)
Medium (vocational education/apprenticeship)	265 (48.8%)
High (higher vocational education, college, or university)	103 (19.0%)
Missing	99 (18.2%)
Means of subsistence	
Own income	312 (57.5%)
Savings or pension	81 (14.9%)
Social welfare	99 (18.2%)
Partner or family members	44 (8.1%)
Missing	7 (1.3%)
Partnership status	
No or temporary partnership	210 (38.7%)
Stable, living apart	65 (12.0%)
Stable, living together	235 (43.3%)
Missing	33 (6.1%)
Children living in the household	
No	418 (77.0%)
Yes	71 (13.1%)

<i>Missing</i>	54 (9.9%)
Self-rated general health	
Excellent/very good	126 (23.2%)
Good	261 (48.1%)
Poor	154 (28.4%)
<i>Missing</i>	2 (0.4%)
Life satisfaction (Questions on Life Satisfaction, scores ranging from 10–40), <i>M (SD)</i>	26.6 (5.9)
<i>Missing</i>	2 (0.4%)
AUDIT-C (scores ranging from 0–12), <i>M (SD)</i>	8.7 (2.4)
Days of alcohol abstention in previous 30 days, <i>M (SD)</i>	11.5 (10.0)
<i>Missing</i>	14 (2.6%)
Substance use except of alcohol in previous month	
No	91 (16.8%)
Yes	452 (83.2%)
Psychotherapeutic/psychiatric treatment in previous 6 months	
No	421 (77.5%)
Yes	113 (20.8%)
<i>Missing</i>	9 (1.7%)
Admission to respective alcohol treatment centre	
First admission	387 (71.3%)
Second or further admission	156 (28.7%)
Treatment assignment	
Own initiative	220 (40.5%)
Partner, family, or friends	73 (13.4%)
Health institution	147 (27.1%)
Social services	31 (5.7%)
Judge	36 (6.6%)
Employer or teacher	20 (3.7%)
<i>Missing</i>	16 (2.9%)

Notes: Values are numbers (%) unless specified otherwise. AUDIT-C = Short form of the Alcohol Use Disorders Identification Test.



Table 2: Client characteristics at baseline by type of drinking goal trajectory

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8
	AAAA	AMAA	AMMM	CCCC	CMCC	CMMM	UMCC_UMAA	CMMA
	(n=34)	(n=79)	(n=62)	(n=116)	(n=112)	(n=92)	(n=22)	(n=26)
Female sex	44.1%	40.5%	33.9%	30.2%	37.5%	34.8%	45.5%	34.6%
Age in years, <i>M (SD)</i>	49.5 (11.4)	45.3 (11.4)	43.3 (13.1)	44.8 (11.7)	43.6 (12.4)	41.6 (11.5)	46.7 (11.9)	44.0 (10.9)
Swiss nationality <sup>a</sup>	76.5%	87.2%	82.0%	93.1%	90.9%	87.0%	90.9%	88.0%
Educational level								
Low	11.5%	20.3%	17.3%	11.8%	20.4%	20.3%	14.3%	10.5%
Medium	73.1%	63.8%	51.9%	58.8%	54.8%	62.0%	52.4%	73.7%
High	15.4%	15.9%	30.8%	29.4%	24.7%	17.7%	33.3%	15.8%
Means of subsistence								
Own income	61.8%	52.6%	53.4%	69.6%	58.6%	59.8%	31.8%	46.2%
Savings or pension	14.7%	17.9%	15.5%	14.8%	13.5%	9.8%	27.3%	23.1%
Social welfare	17.6%	20.5%	22.4%	11.3%	18.0%	20.7%	27.3%	23.1%
Partner or family members	5.9%	9.0%	8.6%	4.3%	9.9%	9.8%	13.6%	7.7%
Partnership status								
No or temporary partnership	39.4%	40.5%	37.7%	44.6%	40.2%	44.2%	47.4%	26.1%
Stable, living apart	15.2%	10.8%	23.0%	6.3%	14.7%	11.6%	15.8%	13.0%
Stable, living together	45.5%	48.6%	39.3%	49.1%	45.1%	44.2%	36.8%	60.9%
Children living in the household	18.8%	14.5%	14.8%	13.5%	18.8%	10.7%	14.3%	8.3%

Self-rated general health								
Excellent/very good	11.8%	17.7%	19.7%	32.8%	25.9%	23.9%	9.1%	20.0%
Good	47.1%	48.1%	52.5%	47.4%	50.0%	48.9%	45.5%	36.0%
Poor	41.2%	34.2%	27.9%	19.8%	24.1%	27.2%	45.5%	44.0%
Life satisfaction (10–40), <i>M (SD)</i> <sup>b,e</sup>	27.1 (6.5)	24.3 (5.8)	26.4 (5.4)	28.4 (5.4)	27.2 (5.7)	25.9 (6.2)	23.6 (6.6)	26.8 (5.5)
AUDIT-C (0–12), <i>M (SD)</i> <sup>a, b</sup>	10.0 (2.1)	9.2 (2.6)	9.0 (5.4)	8.1 (2.3)	8.4 (2.3)	8.5 (2.3)	9.3 (2.2)	9.1 (2.2)
Days of alcohol abstention in previous 30 days, <i>M (SD)</i> <sup>b,c,d</sup>	11.2 (11.0)	14.7 (11.1)	16.9 (10.8)	11.1 (9.2)	9.7 (8.8)	9.1 (9.1)	9.9 (10.0)	9.6 (9.6)
Substance use except of alcohol in previous month	79.4%	79.7%	83.9%	82.8%	79.5%	87.0%	100.0%	88.5%
Psychotherapeutic/psychiatric treatment in previous 6 months	25.0%	25.3%	24.6%	19.3%	15.2%	22.0%	28.6%	20.8%
First admission to treatment centre	70.6%	55.7%	61.3%	78.4%	75.0%	75.0%	77.3%	76.9%
Treatment assignment								
Own initiative	37.5%	37.7%	39.3%	48.2%	45.9%	37.1%	54.5%	23.1%
Partner, family, or friends	18.8%	14.3%	12.5%	12.3%	18.0%	11.2%	9.1%	11.5%
Health institution	28.1%	31.2%	28.6%	23.7%	21.6%	31.5%	31.8%	46.2%
Social services	3.1%	9.1%	3.6%	1.8%	6.3%	10.1%	0.0%	11.5%
Judge	3.1%	6.5%	16.1%	7.9%	7.2%	3.4%	0.0%	3.8%
Employer or teacher	9.4%	1.3%	0.0%	6.1%	0.9%	6.7%	4.5%	3.8%

Notes: A=Abstinence, C=Controlled drinking, U=Undecided, M=Missing. First letter: admission, second letter: discharge, third letter: 6-month follow-up, fourth letter: 12-months follow up, e.g., AMAA=Drinking goal is abstinence at admission, and both follow up assessments but no data on

drinking goal are available discharge. AUDIT-C=Short form of the Alcohol Use Disorders Identification Test. Comparisons of clusters 1 vs. 4, 2 vs. 5, 3 vs. 6, 2 vs. 7, 5 vs. 7, and 2 vs. 8 revealed the following significant differences ( $p < .05$ ): <sup>a</sup>cluster 1 vs. 4, <sup>b</sup>cluster 2 vs. 5, <sup>c</sup>cluster 3 vs. 6, <sup>d</sup>cluster 2 vs. 7, <sup>e</sup>cluster 5 vs. 7.

Table 3: Comparison of treatment outcomes between drinking goal trajectories

Drinking goal trajectory	Non-hazardous drinking at 12-month follow up % (n)	Adjusted OR (95% CI)	Reduction in AUDIT-C score from baseline to 12-month follow up <i>M (SD)</i>	<i>T</i>
AAAA (Ref.)	87.1% (27/31)		8.8 (3.6)	
CCCC	33.3% (31/93)	0.05 (0.01-0.30)**	2.7 (2.8)	-7.56**
AMAA (Ref.)	65.0% (39/60)		5.8 (4.1)	
CMCC	24.7% (22/89)	0.07 (0.02-0.27)**	2.4 (3.2)	-4.42**
AMAA (Ref.)	65.0% (39/60)		5.8 (4.1)	
UMCC_UMAA	50.0% (8/16)	0.27 (0.02-3.14)	4.3 (5.5)	-1.18
CMCC (Ref.)	24.7% (22/89)		2.4 (3.2)	
UMCC_UMAA	50.0% (8/16)	3.23 (0.60-17.50)	4.3 (5.5)	1.85
AMAA (Ref.)	65.0% (39/60)		5.8 (4.1)	
CMMA	72.7% (16/22)	1.93 (0.17-21.81)	6.3 (3.8)	0.83

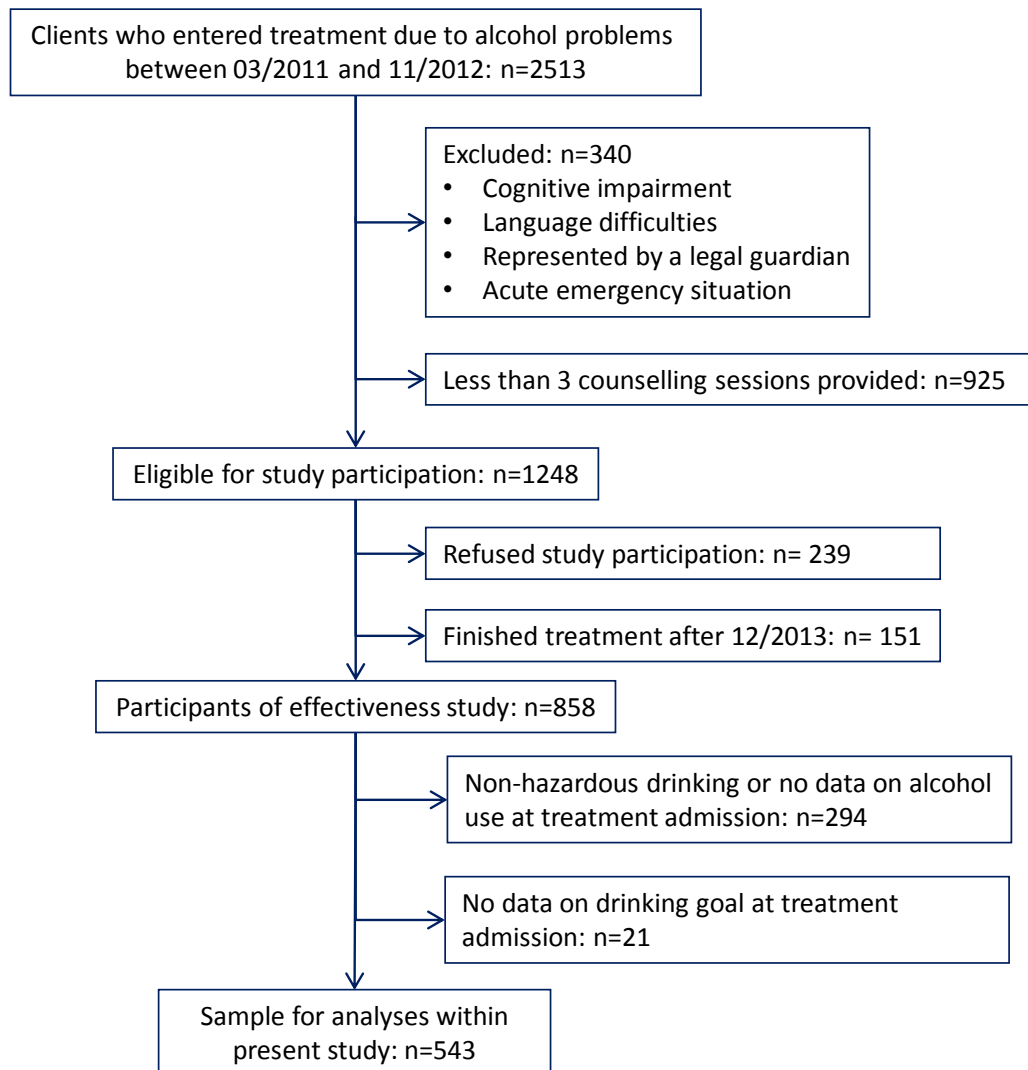
*Notes:* Notes: A=Abstinence, C=Controlled drinking, U=Undecided, M=Missing. First letter: admission, second letter: discharge, third letter: 6-month follow-up, fourth letter: 12-month follow up, e.g., AMAA=Drinking goal is abstinence at admission, and both follow up assessments but no data on drinking goal are available discharge. OR = odds ratio; 95% CI = 95% confidence interval; Ref. = reference category. \*p < .05; \*\*p < .01. Results based on binary logistic or linear regression analyses, controlling for treatment centre and the following baseline variables: sex, age, nationality, educational level, means of subsistence, AUDIT-C score, life satisfaction, days of alcohol abstinence in previous 30 days, substance use except of alcohol in previous 30 days, psychotherapeutic/psychiatric treatment in previous 6 months, and first- vs. readmission to the respective alcohol treatment centre.

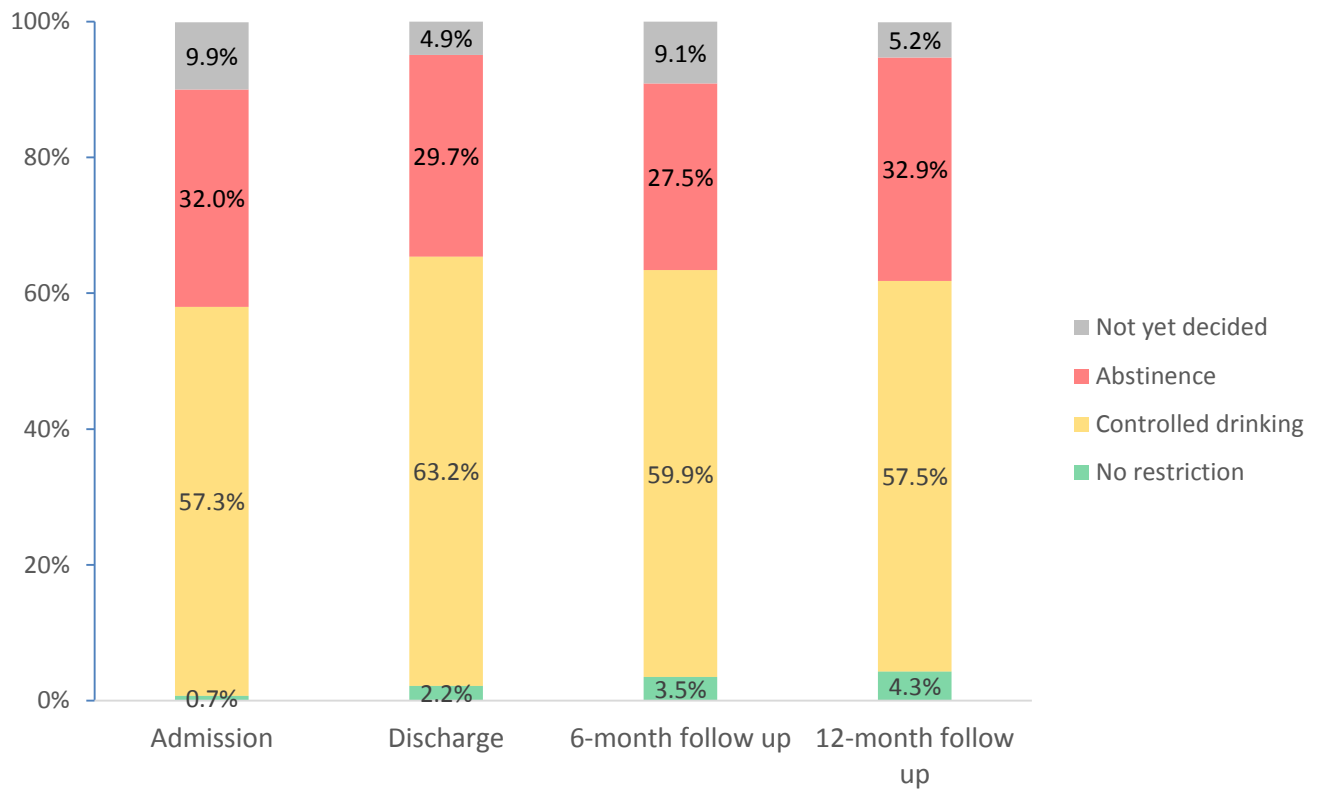
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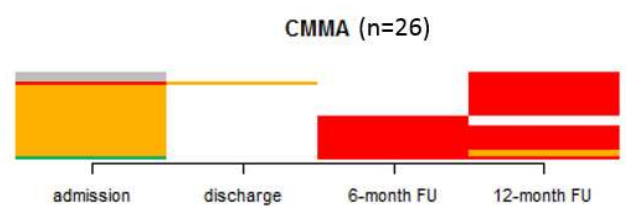
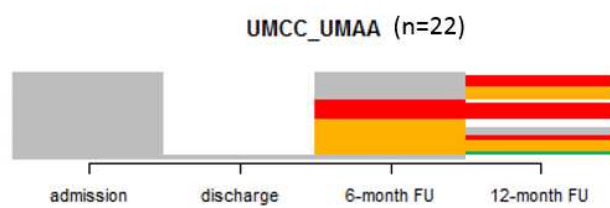
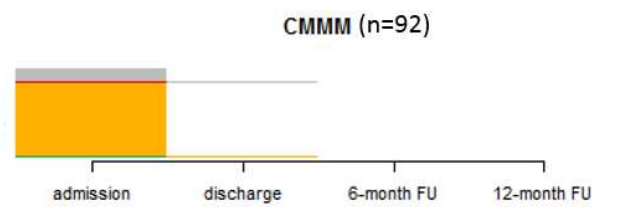
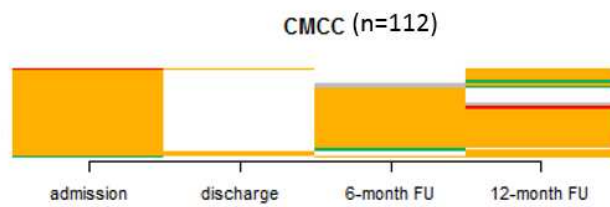
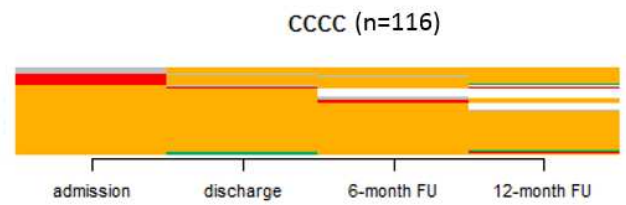
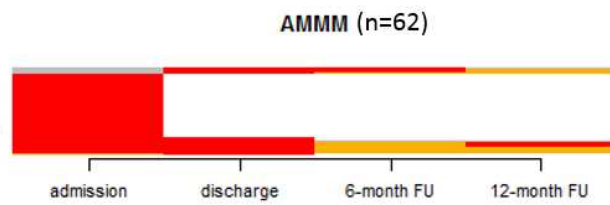
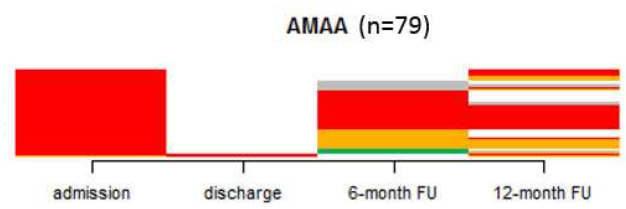
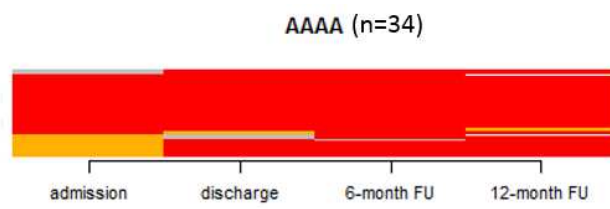
Figure 1: Flow of study participants

Figure 2: Percentages of clients with each drinking goal at each of the four assessments, ignoring missing values, for the assessments at treatment discharge and at 6- and 12-month follow-up

Figure 3: Individual drinking goal trajectories within each of the eight identified clusters. Rows represent study participants, columns the four assessments.







■ no restriction      ■ abstinence      □ missing  
■ controlled drinking      ■ not yet decided